THE

VETERINARY JOURNAL

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Editorials.

THE AMERICAN ARMY VETERINARY SERVICE.

In our last issue we drew the attention of our readers to the fact that an attempt was being made to form an efficient Veterinary Service for the United States Army, and we expressed a hope that it would be done on lines which were sufficiently sensible to attract the best talent; at the same time pointing out the curious anomaly that it was placed under the direct control of the Medical Service. The idea seems so utterly incongruous that it really might almost be described as absurd were it not for its seriousness. The Services are so entirely separate in their respective spheres of action that such a course cannot but lead to disorder, or, at all events it will prevent the best results from being obtained.

To induce the best and most skilled men to "join up," a proper Veterinary Department *controlled entirely and exclusively by Veterinarians* is the first essential, and to commence with it in any other way is a grave error. It should be a Department on its own footing in the same way as the Medical, Ordnance, or any other, and be held responsible for its successful organisation and management to the higher authorities just in the same way as they are. There can be no question of its necessity in order to keep efficient any mounted Service and it is a Unit which, although comparatively small, is of as much importance to the efficiency of the whole Army as is any other part.

To have it started on a proper footing will mean infinitely less of mistakes and trouble in the future, and to have anyone other than a duly qualified Veterinarian as its administrative head is an error.

We Britishers are assured that our American colleagues will see eye to eye with us in this, and if they are fortunate enough to be allowed to profit by the errors which their Allies made when building up their respective Veterinary Departments they will save much loss pecuniarily and much dissatisfaction and heartburning in the future. We have a splendidly organised foe to deal with, and one against whom we must take no chances, and each Department, whether great or small, should consider its opportunities, and make the very best possible use of them to work in unison with the whole.

HORSE RACING.

It is gratifying to read that the Government have sanctioned forty days horse-racing per year. The total stoppage of the pastime was a short-sighted policy which hardly took into consideration the pre-eminence of this country in blood stock breeding, and the necessity of the thoroughbred in the production of half-bred stock and army remounts. Besides, France and Germany have carried on their horse-racing, and it is conceivable that a continuance of the sport will have a better effect on the spirit that makes good soldiers, than a repression which leaves existence dull and dismal to not a few, and prevents others from experiencing the joy of "one crowded hour of glorious life." The staying power and endurance of our army horses is largely a matter of blood. Blood will tell. There is only one trustworthy test of the real value of thoroughbreds; it is provided by the racecourse. The future efficiency of our army depends on keeping up the breed of thoroughbreds. Unless racing exists the profitable production of thoroughbreds, failing an efficient State subsidy, cannot go on. Horseflesh will be greatly depleted the world over after the war, and to conserve, increase, and develop our supply as far as possible is only patriotic, judicious, and wise. To deplete the stock at the present time is but foolish and suicidal action. It is not opportune to greatly injure the source and development of a fine national characteristic and industry that has existed among us in England, Ireland, and Scotland since 1750. The purchasers of Ard Patrick, Galtee More, Slieve Gallion, Minoru, Aboyeur, Orme, etc., knew the value of prime blood stock to their countries, and the desire to benefit his land was not absent from the mind of the French breeder who gave 37,500 guineas for Flying Fox. The production of the stud book, the interest shown by kings, dukes, and lords in horse-racing and the development of breeding, the heterogeneous assembly on a race-course, are all indications of how the sport has interested the classes and masses of the people.

The stoppage of racing means present and future national loss,

the throwing out of productivity, by gelding, of much valuable stock, the closing of breeding establishments, and the selling of horses at ruinous prices. All this indicates that the future supply of light horses will be in jeopardy. No man wishes to dam the onward sweep of an essential stream, but meddling and peddling with the springs that supply it, limit its usefulness and curtail its power to flow and do good. G. M.

Original Communications.

LEPINAY'S TREATMENT OF MANGE OF THE HORSE BY SULPHUROUS ANHYDRIDE.

By VETERINARY OFFICERS VIGEL AND CHOLLET (OF THE FRENCH ARMY VETERINARY SERVICE).

THE ravages produced by mange and other cutaneous affections in our cavalry during the winter have caused us to enquire whether sulphurous anhydride gas could be substituted for the ointments and baths hitherto used in the treatment of these maladies, and whether we could not find a more simple method of action, and a more rapid cure.

This gas, known since ancient times by all chemists under the name of sulphurous anhydride, whatever be the procedure and apparatus employed for obtaining it, was discovered as a particular body by the German Libarius in the 15th century, and studied afterwards by Priestley, Berzelius, and Gay-Lussac. Its antiseptic and parasitic qualities, universally recognised, have been confirmed by experiences made as well in France as foreign countries by Calmette, Langlois, Faiure, Chainot, Stazzi, Borachetti, Naldane, etc., experiences which have already been related, and to which we shall not return.

Majors Bruce and Stanley Hodgson have used it with success in the treatment of human mange, and Veterinary Surgeon A. M. Lépinay in his own clinique obtained excellent results in the treatment of mange of the dog.

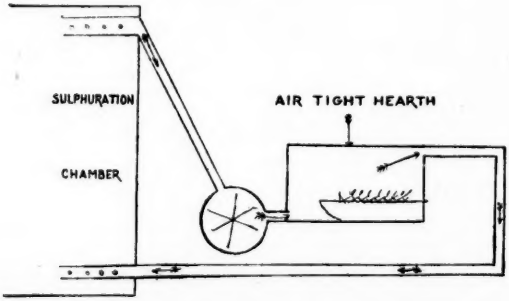
It is in view of the qualities of sulphurous gas, on the experiments made and the results obtained, that we have published our experience.

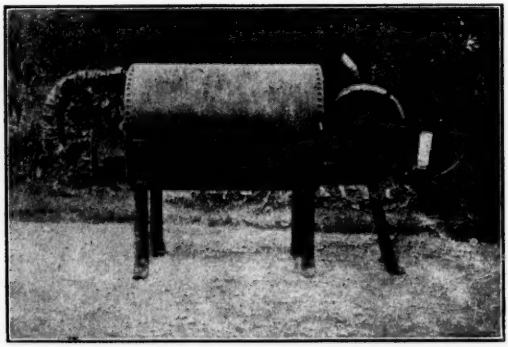
We claim originality for the procedure and its application in the treatment of mange of the horse. In our experiences we have utilised for the production of SO_2, a commercial apparatus constructed for other purposes, but this apparatus was only a makeshift, and was by no means suitable to the treatment of skin ailments such as those we used it on. Since then we have had a

generator constructed which answers our requirements, and allows us to obtain the gas in the desired proportion. In a preceding report we have related our experiences. Our aim to-day is to explain the treatment in detail as we apply it.

Necessary Material.—The necessary material for treatment comprises two distinct things :—

1. The generator apparatus for SO_2.
2. The sulphur gas chamber.





1. The generator is composed of three parts—
   (*a*) An air-tight hearth in which a specially-shaped drawer contains the sulphur in combustion.
   (*b*) A ventilator.
   (*c*) Two pipes pierced with holes at regular distances and which run through the sulphur gas chamber, in its whole length and at the top and bottom of the stalls. The one at the upper part of the hearth, communicates with the

ventilator, the other, for back draught, is at the lower part of the hearth.

Working of the Generator.—The air of the chamber is drawn up by the ventilator, and driven into the hearth over the sulphur, where it increases its combustion, and afterwards is drafted back charged with gas into the aforesaid chamber The holes with which the aspirator and back draught pipes are furnished allow an equal diffusion of the gaseous mixture into the whole of the box.

The accompanying illustration shows the apparatus and its working.

2. The chamber of sulphuration should be air-tight, and of as small dimensions as possible. For our trials we have successively used a one-stall box, then a three-stall, and at present we apply the treatment with a ten-stall structure. This box is composed of ten similar stalls, side by side, separated by adjusted and perforated partitions. Their dimensions are the following : Height, 6 ft. 6 ins. at the anterior part, 5 ft. 5 ins., at the posterior part, 2 ft. 7 ins. wide, and 5 ft. 5 ins. long. These dimensions allow of employing only the quantity of gas absolutely necessary to obtain in the minimum of time the percentage desired of the gaseous mixture and to limit the defensive movements of the animals. At the posterior part the shutter windows allow of access of air. In the front of each stall there is a door in which is a window 2 ft. 7 ins. high, and 1 ft. 11 ins. wide, allowing passage for the horse's head. A cloth collarette fixed on the circumference of the window and drawn round the neck of the horse by means of a running cord protects the head of the horse from the action of the sulphurous gas. This collarette is fixed to a cloth collar with two pads which fill up the jugular furrows in such a way as to hinder all escape of gas at their level.

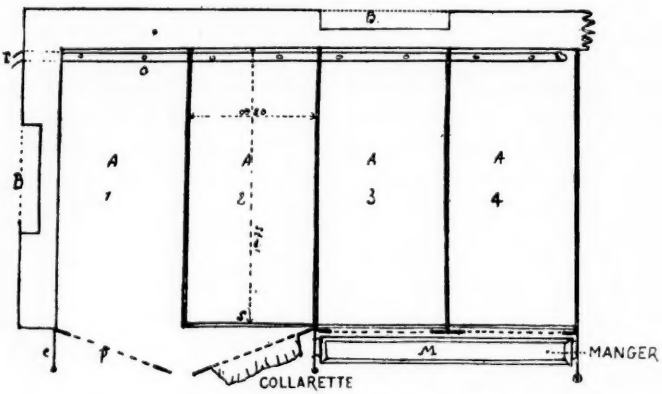
The photographs show the plan of the boxes.

Working of the Sulphur Chamber.—The doors are opened to the full extent, likewise the windows. The horse is backed into the stall. A safety bar is then put up at the level of the chest. This bar is movable and hinders the escape of the animal when the door is opened. The latter is then closed gently. The head of the horse is passed into the collarette, the collar put on, and the running cord drawn up. The head chains are fixed to a ring, and a little manger containing oats is placed before the animal. When all the horses are put in, the ventilation windows are closed.

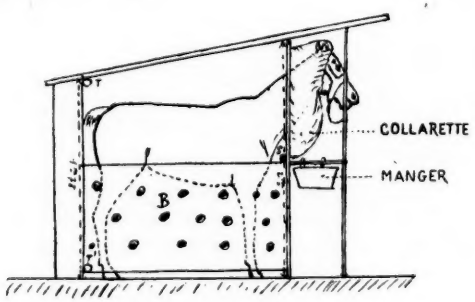
Treatment then proceeds. When this is finished, the ventilation shutters are opened and the gas escapes. When it has nearly all disappeared, the collarette is loosened, the door is opened, and the safety bar lifted up. The animal then comes straight out without any difficulty, and does not inhale the sulphurous gas at any time.

Necessity of Using the Collarette.—The first idea was to shut up the horse completely, provided with a mask, in the sulphuration chamber. The concentration of the sulphurous gas, the duration of the operation, the necessity of watching the animal, were all against

Modified plan of the room for sulphuration in series. The doors are twin ones. The mangers are made for two stalls.



A.—Stalls: Width, 2 ft. 7 ins.; length, 5 ft. 5 ins.; height in front, 6 ft. 6 ins.; height behind, 5 ft. 5 ins.
B.—Window for ventilation.
C.—Bars limiting the opening of the doors and serving as a support to the mangers M.
P.—Doors.
S.—Safety bar.
T.—Pipe (aspiration and return draught).
O.—Hole pierced in the pipe.



SECTION.

S.—Safety bar.
T.—Pipe for departure of gas.
T1.—Pipe for arrival of gas.
B.—Fixed perforated partitions.

this. The plan of the cloth collarette gives us entire satisfaction. It is quite ample enough for the animal to move its head and neck freely. It is also cheap and can be easily replaced. The collarettes are cylindrical cloth tubes, 2 ft. 7 ins. long, and with a circumference of 6 ft. 1 in.

Treatment of the Head and Neck.

As we have indicated, it was impossible to use a respiratory mask. But the collarette, which allows the animal to breathe the outside air beyond it, hinders the sulphurous anhydride from acting on the head and extremity of the neck. In order that these regions may be treated at the same time as the remainder of the body they are submitted, when the horse comes out of the chamber, to a vigorous dressing of cresylated oil 1 in 10, for preference with a hair brush.

In order to destroy the psoroptes existing in the external ear (as noted by M. Henry, Professor of Parasitology at the Veterinary School of Alfort) we introduce into the ears a recent and warm emulsion of 3 per cent. cresyl, at the same time working about the base of the ear. Horses submit very quietly to these simple and rapid manipulations. The treatment of the head and neck ought to be carried out with great care. As a matter of fact, the only relapses, and these quite benign, that we have seen are always produced in those regions not affected by the sulphurous gas, and have moreover easily yielded to a second application of cresylated oil.

Technique for the Treatment.

According to the results of our experiences and those obtained since, where we apply the treatment in series we have adopted the following technique:

1. Clipping of the horse.

2. Careful washing with a solution of carbonate of soda and of soft soap worked in with a stiff brush.

3. When the skin is thoroughly dry, generally on the morrow, place in the sulphurous fumes.

Each series of ten horses remains submitted two hours to the action of the sulphurous anhydride. Our generator apparatus allows us to rapidly attain a concentration of 5½ to 6 per cent. and the temperature in the interior of the structure may rise up to 30 degs. C. (86 degs. F.) The percentage and this temperature have only some advantages, for one knows the more one or other are raised, without over-reaching 32 degs. C. (90 degs. F.), the more effective the action of the gas is.

We have never had the least accident in 500 horses treated.

4. Care for the head, neck and ears indicated on coming out of the sulphur chamber.

5. Second washing three days after application.

Remarks.

To obtain good results and not to render the method responsible for possible relapses it is necessary to take some of the following absolutely indispensable precautions :—

1. Immediately after the treatment provide the animals with carefully disinfected halters and tie-ups.

2. Put them in places equally carefully disinfected.

3. Ensure them a regular grooming which facilitates the elimination of epidermic debris and stimulates the function of the skin. This grooming may be very advantageously completed by some washings of the body.

4. Exercise rigid supervision in such a way that any animal capable of contaminating his companions may be immediately separated.

5. Carefully disinfect all stable utensils and harness.

If in spite of all these precautions a relapse occurs, a second course of treatment immediately applied suffices to overcome it.

This method of procedure has given us conclusive results. In fact at the present moment, of 500 horses treated, 200 have been evacuated (120 in one month). The others, from the point of view of health, are still unattached, either on account of poor condition or by reason of illness contracted at the Depôt.

Conclusions.

The sum total of our experiences and the success obtained since we applied the treatment in series induces us to come to the following conclusions, which only confirm those put forth in our preceding report.

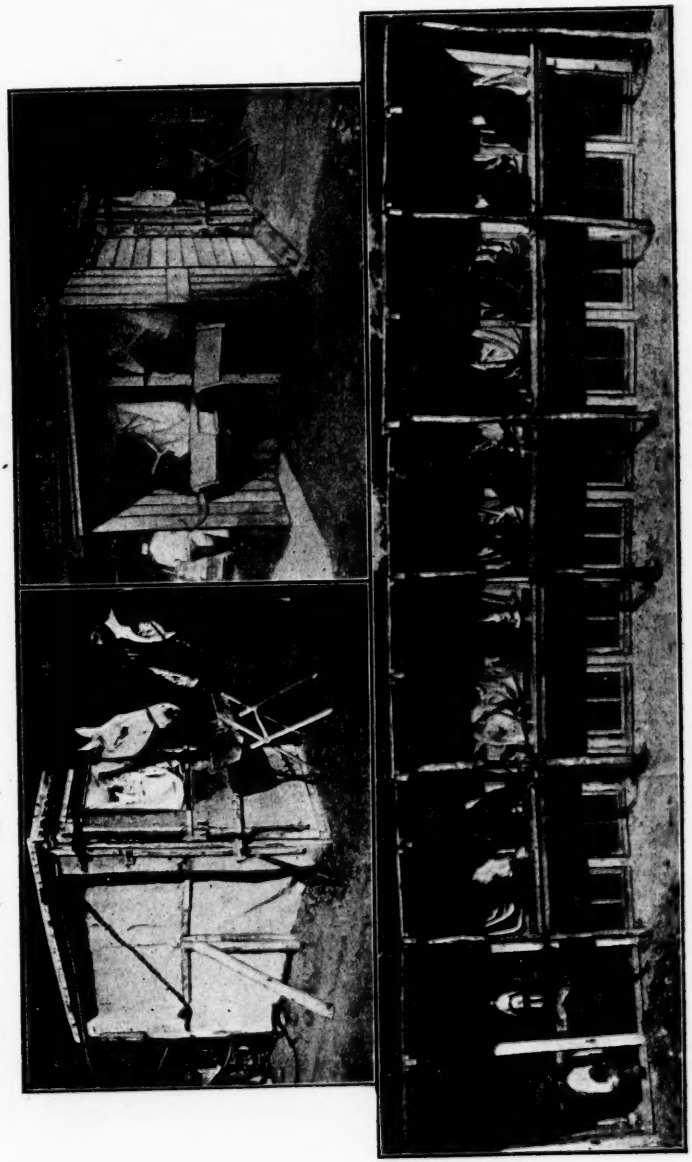
The treatment of mange of the horse by sulphurous anhydride is an effective, simple, inoffensive, rapid, and economic method.

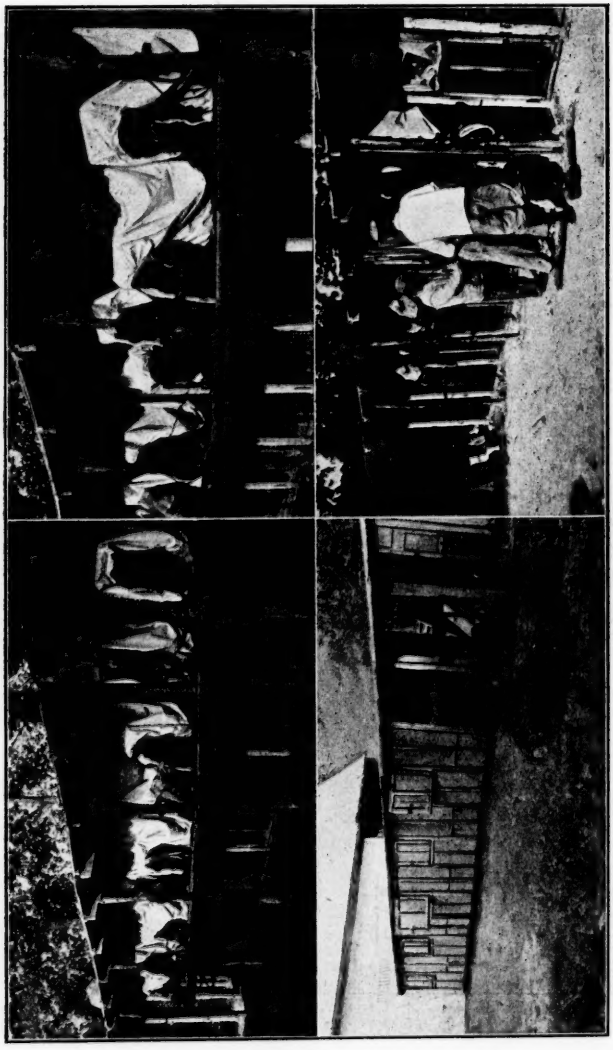
1. It is effective ; as a fact at the end of a few days the specific clinical signs of mange have disappeared, the animal no longer rubs itself, and the skin returns to its normal state of good health

2. It is simple. No specialised personnel is necessary for the application of the treatment, whilst the horse is absolutely plunged into a bath of sulphurous gas

3. It is inoffensive No animals treated have been inconvenienced by sulphurous vapours.

4. It is rapid. The animals are only submitted to one application of two hours, and all care necessary for their cure, such as two washings





and sulphuration, can be given in the space of a week More than this the actual sulphuration room allows us to submit forty horses a day for treatment. We thus obtain an important result.

5. It is economic from several points of view.
   (*a*) Because it cures mange in the minimum time.
   (*b*) Because it does not in any way prejudice the health of the animals, and allows them to quickly recover their condition, it lessens the time of their detention.
   (*c*) Because all animals treated are cured.
   (*d*) Because there is no need for fresh and expensive installation.
   (*e*) Because the treatment of a horse at the market price of sulphur amounts to 75 centimes ($7\frac{1}{2}$ pence).

TREATMENT OF RINGWORM.

We have treated nine horses with ringworm in the same way as those with mange. The results have been absolutely satisfactory.

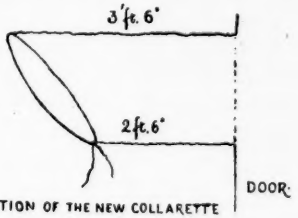
TREATMENT OF LICE.

Lice and nits are radically destroyed without any recurrence by a sulphuration of 25 minutes.

Prevention of Mange, Ringworm, and Lice.—Before their departure from the depôt, as evacuated, all horses are submitted to the new treatment, which acts as a preventative against contamination which may have occurred unknown to us.

ADDENDUM.

An improvement to our technique has been devised in the use of the collarette since the issue of our report. A new plan simplifies the treatment of the head and neck regions. The collarette is drawn



SECTION OF THE NEW COLLARETTE

up over the ears of the horse, *i.e.*, on to the forehead, above the eyes, on to the temples, under the throat. The neck, the parotid region, the ears and their interior, are in this way submitted to the action of the SO_2, and only a part of the head remains to be treated with the cresylated oil. The halter, which is too thick to allow of drawing up of the collarette, is replaced by a strap. No escape of gas can irritate

the eyes, in spite of their proximity. On the other hand, to give sufficient liberty to the head of the horse, the length of the superior part of the collarette is prolonged from 2 ft. 7 ins. to 3 ft. 6 ins.

The advantages from this modification are:—

1. The action of the gas on regions otherwise not reached, and doing away with the necessity of subsequent attention to these regions.

2. Economy of 50 per cent. of cresylated oil.

3. Economy of time.

During the stay of the horses in the sulphuration chamber their head collars are carefully disinfected.

G. M.

SOME MAIZE BY-PRODUCTS.

By R. G. LINTON, M.R.C.V.S., Professor of Hygiene,
Royal (Dick) Veterinary College, Edinburgh.

THE present scarcity and high price of cereals has caused horse-keepers to utilise foods less suitable for human use and cheaper than oats. The residual by-products obtained from oil-seed crushing, and from the preparation of cereals for human use, are now more eagerly sought after for the feeding of horses than was the case when cereals were plentiful and comparatively cheap. Among the latter products are those which remain after the extraction of starch from the maize grain for the manufacture of textile starch or cornflour. As these residuals are usually put on the market at a comparatively cheap rate, and as they possess qualities which are essential to a ration for hard-working horses, the following notes may be of interest.

The maize grain is made up of an outer skin or husk, a germ and an endosperm. The husk has the histological characteristics of cereal grains with minor diagnostic features.

As with wheat and other cereals, the endosperm is surrounded by a single layer of so-called aleurone cells. It forms about 85 per cent. of the grain, and is composed of starch containing cells, the starch granules being embedded in, or bound together by, altered protoplasmic proteids. The term "gluten" is a generic one, applied to all the nitrogenous constituents of cereals; it is sometimes used to designate the layer of so-called aleurone cells which Professor Johnson has aptly called the vitamine layer.* The germ, devoid of starch, is rich in protein and oil, and if carefully removed will be found not to exceed 6 per cent. of the entire grain.

There are two classes of maize residuals—those obtained from the

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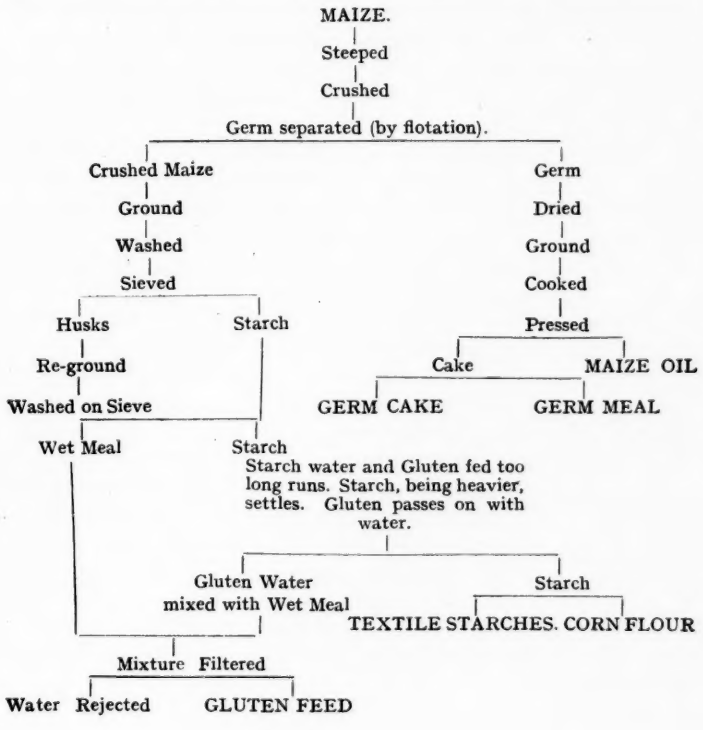
manufacture of "Indian meal" and those which are left after the starch has been extracted from the grain, as in starch works.

In the manufacture of Indian meal, the maize grain is broken, de-husked and de-germed by dry process. The de-germing efficiency is very low, and the "germ" therefore contains a high percentage of endosperm or starchy matter. This germ residual is the *maize germ meal* or *cake* commonly reported as having an analysis as follows :

Protein.	Fat.	Carbohydrate.	Crude Fibre.	Ash.
13%	12%	56%	4%	4%

The maize germ meal of the starch works is obtained in a different way, and has an analysis quite unlike that obtained in Indian meal milling. These two germ meals are sometimes confused. The manufacturer of textile starch or of cornflour aims at extracting the starch from the grain completely separated from husk, germ and gluten. The processes involved are depicted in the accompanying chart.



The grains after being thoroughly cleaned are put to soak in vats containing a weak solution of sulphurous acid, which softens them and facilitates the separation of the husk and germ.

After complete maceration the grain is crushed and conveyed to tanks of water where the germ, now separated from the rest of the grain, floats to the surface on account of its oil-content and is removed. It is then rolled, dried, cooked, and subjected to hydraulic pressure, which removes most of the oil and leaves a residual cake known as *maize germ cake*, or if re-ground as *maize germ meal*. Contrary to what is the case with Indian meal milling, in starch works the de-germing of the grain is an important process. The germ must be removed in an entire state, and completely removed from the grain. It is a flotation process, and if any of the endosperm was attached to the germ the latter would not float. Therefore, the whole germ, and nothing but the germ, must be removed. When this pure germ is pressed to contain 10 per cent of oil, it leaves a cake or meal having a percentage composition as follows :—

Protein.	Fat.	Carbohydrate.	Crude Fibre.	Ash.
23%	10%	41%	4%	1.50

The efficiency of de-germing is the controlling factor of the protein content of germ cake and meal, hence the difference in the composition between the "Indian meal" germ cake and the "starch works" germ cake.

Reference to the chart of the starch works process will show that the crushed and de-germed corn is then ground, washed and sieved. The husk, and with it the vitamine layer of the endosperm, is separated from the starch, re-ground and again washed and sieved to remove any starch which may remain. The two lots of starch, which still contain the gluten, are mixed in water and conveyed as *starch liquor*, to long, slightly-inclined runs. The starch, being the heavier, settles, and the gluten is carried off with the water.

In addition to the maize germ cake, there are now two other residuals, the ground husks or bran, and the gluten. According to individual manufacturer's inclination these two residuals are either dried and put on the market as separate commodities, *maize bran* and *gluten meal*, or the two are mixed while still wet and the mixture filtered, the residue being ground and dried and sold as *maize gluten feed.*

Pure gluten meal is a heavy meal containing about 35 per cent. of crude protein. If the bran and such grits as may be adherent are mixed with it, a more suitable food-stuff, and one which is more easily eaten, is produced. It is now seldom that the meal and bran are sold separately.

The percentage composition of maize and some of its products are as follows :—

	Water.	Crude Protein.	Fat.	Carbo-hydrate.	Fibre.	Ash.
Maize	11	10	5	70	2	1·5
Bran	9	9	6	62	13	1
Germ meal (I.M.) ..	11	13	12	56	4	4·0
Germ meal (S.W.)..	11	23	10	41	4	1·5
Gluten meal ..	10	35	4	45	2	·8
Gluten feed ..	10	24	4	56	5	1·1

Maize and its products are well digested by both oxen and horses, but the latter make less use of the fat than do cattle. Since the composition of maize by-products varies according to the method and completeness of the starch extraction, the starch equivalents and nitrogenous ratios here given can only be regarded as approximations sufficiently near for practical application. The same set of figures will do equally well for horses and oxen.

Foodstuff.	Starch Equivalent. Maintenance.	Production.	N. Ratio.
Whole Maize ..	82	80	1:9·5
Germ meal (I.M.) ..	85	79	1:8
Germ meal (S.W.) ..	85	77	1:3
Gluten meal ..	85	76	1:1·5
Gluten feed ..	85	77	1:3

It will be seen that though maize and the above by-products are practically isodynamic, they are divisible into two distinct classes; those having a medium nitrogenous ratio of 1:8 or 1:9, including whole maize and the Indian meal miller's germ meal, and a second class with a narrow nitrogenous ratio of 1:2 or 1:3, which includes maize gluten meal, gluten feed, and the starch works germ meal.

The use of maize as a concentrate for horses is strongly advocated by some horse-keepers and veterinary practitioners, and no less emphatically condemned by others.

Neither whole maize nor any of its products can be regarded as a complete food. Being deficient in mineral matter and lacking some essential amino acids, maize fails to procure growth or even to sustain life if it forms the sole diet. The eating of sound maize by people does not cause any untoward result, but damaged grain, that which has got damp, is held to be responsible for pellagra, a condition which is analogous to ptomaine poisoning. The bad effects which follow the feeding of damaged cereals to horses are well known, the most prominent symptoms being profuse polyuria and rapid emaciation.

There is sufficient proof that sound, whole maize can quite well

form the bulk of the concentrate ration of mature working horses, provided that it is fed intelligently. The feeding of even sound maize to horses is often blamed for causing an eczematous eruption, and undoubtedly it sometimes does ; but it is well known that if the grain be given in small quantities to begin with, and is then given in regularly increasing amount, and not intermittently, either no bad effects are noticed, or they are of a transient nature. Where undesirable effects are pronounced it is invariably to be found that the feeding has been either injudicious or that the supply has been irregular.

The alcohol soluble protein *zein*, on hydrolysis, yields neither glycine, lycine, nor tryptophane, and the injurious effects sometimes caused by the feeding of sound maize has been attributed to the absence of this latter amino acid.

It has also been held to be due to an excess of phenyl-alanine and tyrosine, which readily split off phenylic compounds and so produce phenol poisoning. It is highly improbable that the bad effects which do sometimes follow an incautious use of whole maize are due to a lack of any essential amino acid. The symptoms are not those which result from nutritional deficiency, and, furthermore, with constant and regular feeding of the grain, the bad effects cease to be apparent. The reverse would be the case if the absence of one or more essential amino acid was responsible. Mr. W. Acton, M.C.S., chemist to Messrs. Wm. Mackean, Ltd., starch manufacturers, Paisley, suggests that the hurtful property is located in the soluble albuminoids of the corn which are present to the extent of 0·7 per cent. in the whole grain. These so-called soluble albuminoids are partly albuminoids in course of formation, and are nearly allied to the amino acids to which they are easily degraded by hydrolysis.

Most ptomaines are derived from the amino compounds, and Mr. Acton is of the opinion that there is a possibility that the smaller an albuminoid molecule is the more liable it is to be absorbed into the system, and if absorbed in sufficient quantity, and before the body has had time to prepare its defences, injurious effects result. The view that the eczematous eruption is in some way connected with the " corn solubles " is upheld by the fact that no bad results have so far been noticed after the feeding of maize products from which the solubles have been removed by the leaching which is necessary for the complete separation of the starch from the other constituents of the grain. In some factories the wash water is evaporated and the residue added to the by-products. This increases the ash content, and is said to raise the nutritive value of the food, but it would appear to be of doubtful utility, and unless the acid residue is neutralised with an alkali, the gluten feed would be too acid to be palatable.

During the last few months maize gluten feed has figured in the rations suggested for horses in the *Journal of the Board of Agriculture.* As this food has been but little used as a concentrate for horses, and as there is, therefore, but little known as to its suitability for this purpose, the writer, at the cordial invitation of Messrs. Wm. Mackean, Ltd., visited their works in order to obtain an insight into the manufacture of this product with the idea of testing it on horses, and he is greatly indebted to this firm for the kind courtesy shown him, and for the material supplied for the feeding trials.

Gluten feed, when produced and marketed as described, is a rather coarse and heavy meal—that is, in comparison with other meals. It was at once apparent that ordinary gluten feed is not suitable for the feeding of horses when their concentrates are mixed with cut straw or cut hay, and especially if the food is mixed in bulk for a large number of animals. The feed on account of the small size and weight of the pieces settles out, and a thorough mixture is not maintained. For the same reason it falls to the bottom of a nose-bag and is not readily picked up and eaten. With the ordinary rough wooden mangers found in many commercial stables horses have great difficulty in eating this class of food and consequently there is considerable waste.

At the writer's suggestion, Messrs. Mackean kindly supplied a quantity of the feed which was bagged after drying. This gave a much more suitable material, but still it was not in large enough pieces to be eaten without waste. Trial with hacks and harness horses fed from iron mangers, and with the gluten feed mixed with oats without the addition of chaff, showed that it could be eaten up clean, but that it was not coarse enough for the ordinary feeding of commercial horses.

A further suggestion brought out a much coarser product which satisfactorily solves the physical difficulties of the ordinary gluten feed. Horses show a distinct liking for this food, and will eat it readily from the hand, and do not refuse it when mixed with oats or other cereals. Throughout the trials there was no evidence that it became pasty in the mouth when mixed with saliva.

Maize gluten feed contains digestible nutrients in much the same proportion as field beans, both contain about 19 per cent. of digestible protein. The gluten feed is therefore a concentrate which can be used to increase the amount of available protein in the ration of working horses, and it is probable that it can replace the legumes for this purpose when the latter are difficult to obtain or are too expensive. It is a nitrogenous concentrate which deserves a more extended use among horses-keepers, not only on account of its nutritive value, but because of its comparatively low cost.

XUM

Maize germ cake is also palatable to horses, though some may not freely eat it for the first day or two. The writer suggested its use to a farmer whose horses were falling off in condition during the hard season. The beneficial result from including more nitrogenous food in the ration during the hard-working period soon made itself apparent.

REMARKS ON SAND COLIC AS MET WITH IN EGYPT.

By MAJOR G. McINTYRE, A.V.C. (T.F.).

Sand may be present in the bowels in small quantities without producing any appreciable symptoms. As it accumulates, however, it begins to cause serious derangement. The first sign of trouble is frequent attacks of diarrhœa and falling off in condition. The diarrhœa is particularly noticeable after the horse has been at work. These symptoms, I think, are due to the irritation of the mucous membrane of the bowels by the sand. This irritation causes the bowels to evacuate their contents before they are properly digested.

The first actual symptoms shown may be very slight—simply a general uneasiness. The animal may continue feeding, but will break off frequently, appearing dull and hanging its head. The subject may show these symptoms at frequent intervals for some time before having an attack that will present colicky pains. When such an attack does occur, the symptoms exhibited differ from those in colic due to other causes by not being so violent. The animal is markedly uneasy, lying down and getting up frequently. It goes down very steadily, and when down the favourite position is on the side. Violent efforts to roll are seldom present, though there may be attempts to get on the back. In severe cases considerable difficulty is experienced in inducing the animal to get up, particularly if he is lying on a comfortable soft place.

The membrana nictitans, breathing and pulse are only abnormal in very severe cases, and then these symptoms do not differ from those found with "twist of the bowels." A certain amount of flatulence may be present, depending largely on the nature of the subject's food.

I consider the preference of the animal to lie on the side and the peculiar disinclination to rise to be almost diagnostic of sand colic.

Pathology.

All *post mortem* examinations of the bodies of animals that have died from sand colic show practically the same conditions. An accumulation of sand is found at the pelvic flexure of the large colon. The mucous membrane of the bowel is inflamed and the blood vessels

engorged. The bowl anterior to the accumulation of sand may be full of semi-fluid material, but posterior to the obstruction it is generally quite empty.

In about 20 per cent. of cases the large colon is found to have taken a half turn on itself. I have found the mucous membrane of the colon very inflamed, and presenting quite a dark red appearance. There was a sub-mucous gelatinous exudate which gave the bowel a very thickened appearance.

Method of Introduction.

Sand is introduced into the digestive canal by various means. The most important of these is by the horse deliberately eating the sand. When stables or lines have a sandy floor it is quite common to see the horse licking and eating the sand during idle moments between feeds. This can be largely prevented by feeding six or seven times a day instead of the usual four times.

When grain or broken pieces of hay lie about on the ground the horse tries to pick them up. In doing so he gathers sand as well. Dirty feed conveys sand to the bowels. The fodder that offends most in this way is sucrapaille, as the sand sticks to it easily. Tibben carries a lot of sand and grit. This is largely due to its preparation.

Sand accumulates in nosebags if they are not properly cleaned and dried after feeding. Nosebags should be turned outside in after feeding and laid out to dry, as moisture from the breath of the horse condenses in them while he is feeding. When dry, they must be well shaken and turned proper side out.

Preventive Measures.

Careful horse-management is the greatest preventive of sand colic. The points to consider principally are :

(1) The best method of feeding the animal.
(2) The study of the horse's habits.
(3) Determining whether the sand is salty or not.

Everybody in charge of horses ought to have a general idea of the anatomy and physiology of the animal's digestive tract. Owing to the small size of its stomach and the rapidity with which food leaves it, the horse may be said to be always hungry. Within an hour of finishing a feed he is looking round for more. Thus, if he is fed three, or at most four, times a day, as is usual, there are long spells in which he will nibble at anything within his reach and try to pick up bits of food from the ground.

(1) The best method of feeding the horse is by giving small quantities at frequent intervals. On service in the field the nosebag is found to be too small to hold the day's rations in even four feeds. The procedure I advise is as follows :—

(*a*) The hay or dries should be chopped.
(*b*) All the grain issued should be mixed and divided between four feeds.
(*c*) With each feed of grain put tibben or chopped hay about 1½ lb.
(*d*) The remaining "chop" to be divided into three feeds, and given in intervals between the grain feeds.

In this way the horse is always fed just about the time when he begins to get restless.

I found that by adopting this method of frequent feeds, sand muzzles were not required, and were finally discontinued.

(2) A study of the horse's habits is always instructive. He may bolt his food or be a very slow eater. He may be a wind-sucker and crib-biter. There may be a bully or two amongst them, and when animals are fed out of mangers, these generally upset the others and should be removed to a place by themselves or fastened at the end of the line.

(3) If the sand is salty there is much more danger of the horses licking it, as they like salt. To try and obviate this, I gave them plenty of salt in their food. I found that the salt out of the bacon boxes was not used, so collected it and gave it to the horses with excellent results. I observed that giving ½ lb. of boiled linseed weekly decreased the number of cases of colic.

Treatment.

I have had most success with ammonium carbonate followed by a drench of linseed oil and turpentine. I give two 4-drachm ammonium carbonate balls when first called to the case. If these do not relieve it, I continue giving one ball every three-quarters of an hour, and give the oil drench after the second dose of ammonium carbonate.

The reason I do not give the drench at first is that, if possible, I prefer to give it when the horse is normal, and in most of the cases that I have attended the first dose of ammonium carbonate has been all that was required. After an attack of sand colic I always physicked the horse. If linseed oil was not available, an ordinary 4-drachm physic ball was given. I prefer linseed oil, as it is more soothing to the bowel and more certain in clearing out the sand.

I do not believe in the use of sedatives, except in very severe cases, where it is necessary to prevent the animal from injuring itself too much. For this purpose I use chloral hydrate, 1 oz.

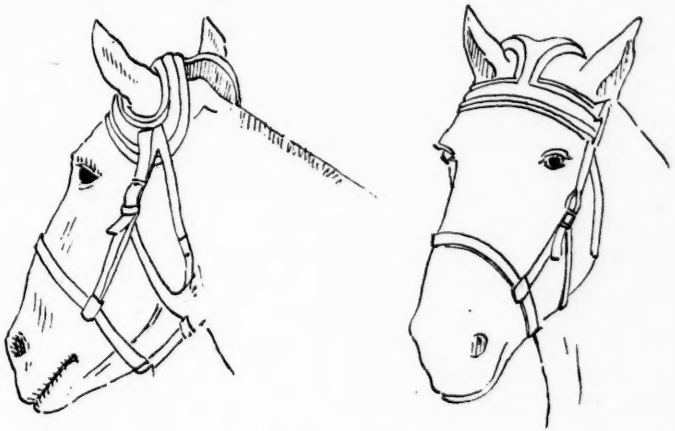
Hypodermic injections of arecoline and eserine I consider dangerous and do not advise their use.

A POLL EVIL BRIDLE.

By MAJOR J. R. HODGKINS, F.R.C.V.S.
Army Veterinary Corps.

WHEN an animal is recovering from an operation for poll evil, it seems a pity that its services should be entirely lost because of the need of an apparatus which can be used as a bridle, and yet do no injury to the healing wound.

Such an apparatus has been devised and is used constantly in this hospital. I attach a sketch of it.



It consists of a light iron framework, which passes across the brow and rests on the supra orbital processes and encircles each ear. The ironwork is leather-covered and is stitched on to felt which corresponds in shape, but is larger than the framework. The cheek pieces and throat lash are attached to the framework at a point below the base of the ears. The portions of the framework encircling the ears are bent forward in such a manner as to entirely dispense with any pressure in the region of the poll.

DISINFECTION OF STANDINGS.

By MAJOR J. R. HODGKINS, F.R.C.V.S.
Army Veterinary Corps.

TAR is a splendid application for the woodwork and ironwork of a standing, as a complement to other methods of disinfection. It has a serious drawback in the length of time it ordinarily takes to dry.

By the following method a standing can be tarred and rendered

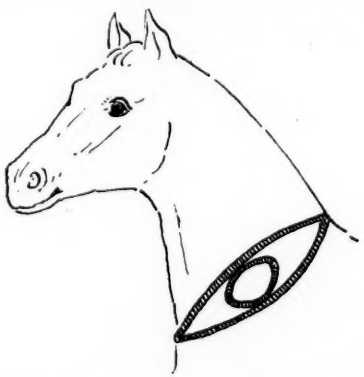
fit for occupation in half an hour. The usual methods for the removal of dirt in the way of scrubbing with hot water and antiseptic having been carried out, the standing is "lamped" out. This dries the wood, iron, and other work. The hot tar is then applied. The application having been completed, the disinfector takes a small tin scraper in his left hand, and a brazing lamp in the other. He boils away the surplus tar with the lamp, scraping the surface up and down, until the wood or other material is perfectly dry. The flame which arises from the tar is easily controlled and put out by the scraper. Tar applied in this way "creosotes" the woodwork and preserves it.

If a standing has already been tarred several times, it will be found that only at a few places will the tar need renewing. The application of the flame boils up the existing tar, which should be scraped up and down until a clean, dry surface remains.

TREATMENT OF SEROUS ABSCESSES ON THE SIDE OF THE NECK AND SHOULDERS RESULTING FROM BITES.

By CAPTAIN A. R. ROUTLEDGE, F.D.C.V.S.
Army Veterinary Corps.

THIS lesion shows little or no tendency to absorption, and if lanced the cavity always suppurates and, though the sac shrinks, the discharge continues indefinitely. Cicatrisation causes a wrinkled



The method of incision in operating for serous abscess in the region of the neck. Note the direction of long axis of operation wound and long acute angles.

condition of the skin—always unsightly—if near the draught part of the shoulders it ruins a horse for harness work.

Method of Operation.—Excision, which can be carried out standing,

with or without a local anæsthetic. The tissues to be excised should be included in a long elliptical incision, the long axis being at right angles to the long axis of the neck. (See attached sketch.) The skin in the neck region is very loose, and if the incision is long and acute-angled the wound will draw in to a straight line.

The resulting operation wound may appear alarming—as much skin as 18 by 9 inches has been excised repeatedly in this hospital. The operator need have no fear, the wound invariably makes a good recovery without complication. Where a large portion of skin has been removed the average time for recovery is about two months.

TREATMENT OF GREASE.

By Captain A. R. ROUTLEDGE, F.R.C.V.S.,
Army Veterinary Corps.

The use of the actual cautery is by no means novel, but the success attending its judicious application appears to be little understood or taken advantage of these days. In this hospital gratifying results have been attained, especially in the "grape" variety of grease, when the following procedure has been carried out.

The patient having been cast, chloroformed, and the limb suitably fixed, the hair is clipped off short, and the seat of operation washed and cleansed, and the tourniquet applied. With a sharp small scalpel, shave the "grapes" or verrucose tissue, until the epidermis is reached.

A red-hot flat firing iron of the ordinary pattern is then rubbed over the surface, when it will be noticed that one gets exactly the same re-action as in searing a cankered foot. The diseased tissue fizzles up like toasted cheese. If the application of the iron is continued the tissues become chrome leather-like in appearance, then yellow and brown. When the brown stage is reached it is most important to stop further cauterisation, otherwise sound tissue will be damaged, prolonging the healing process. Continue till all the diseased area has been dealt with. In the case of rugæ or folds, it is best to shave them off, and apply the hot iron in the same way.

Thoroughly anoint the operation area with zinc ointment, which is left on for three days, after which period it is removed and a fresh dressing applied. Between seven and ten days after operation an eschar or slough will separate and peel off. Treat as an ordinary wound as the conditions indicate—powdered alum is very useful. Recovery takes place in three to four weeks. If the operator has carefully and thoroughly done his work there is no tendency to recurrence.

ANTHRAX: A PECULIAR CASE.

By Captain J. MALCOLM ARMFIELD, A.V.C.

Several months ago I was called to give an opinion on the cause of death of a native-bred ox, being informed that foul play was suspected. The natives in this district stab cattle up the rectum with assegais, hoping to get the carcase for food. (Similarly they sometimes pierce pigs through the heart with hat pins—but this is another story.)

As the carcase was in good condition and the death sudden, I took a blood smear from the ear and examined microscopically for anthrax baccili. Finding none, I opened the carcase, but could find no trace of a spear injury in the bowel, although I searched carefully, and the spleen was normal in every respect. Being puzzled, I took a piece of the ear home, made another slide, this time finding typical anthrax baccilli. I explain the different results of the two smears as follows:—

The first one was stained by McFadyean's method, and, I presume, in endeavouring not to overfix the slide by heat, it was not fixed sufficiently; consequently, the bacilli disappeared in the subsequent washing.

The second slide (in which typical bacilli appeared) was stained by the usual methylene blue method, fixing with absolute alcohol.

I report the case as anthrax in cattle with a normal spleen is rare, and also to show the possibility of a mistake in carrying out McFadyean's method of staining.

TREATMENT OF ULCERATIVE CELLULITIS WITH PICRIC ACID.

By Captain T. G. S. BOGUE.
Army Veterinary Corps.

Ulcerative cellulitis has proved itself a very troublesome disease amongst horses in the Army. Although I have been in France since November, 1914, I did not come across a case of it until October, 1916.

The disease begins usually as a painful swelling, extending from the hock or knee, as the case may be, to the coronet; one limb, generally a hind, being first affected, though later on the infection may spread and involve another limb. A small, bulbous protuberance first appears on the swollen leg. This soon bursts, discharging blood-stained pus, and leaving an ulcer difficult to heal. The horse, which at the onset of the disease is generally very lame in the affected limb, exhibits great relief once the swelling bursts. Other bullæ may appear later and burst, leaving the limb a most unsightly object.

Heavy horses are more severely affected than the lighter breeds, and do not so readily respond to treatment.

Having tried all the treatments recommended, with little or no success, I experimented with a 1 per cent. aqueous solution of picric acid with most satisfactory results, it being used in the following way: Carefully clip the hair from the affected limb, and wash with soap and warm water to clean off all discharge. Dry with a soft cloth. Then soak a piece of gauze, folded in several layers and sufficiently large to cover the ulcers, in a 1 per cent. aqueous solution of picric acid; apply this to the limb, cover with dry cotton-wool, then a piece of jaconet, and bandage to keep the lot in position. Remove in twelve hours, wash away any discharge with warm water, then gently syringe out the ulcers with the solution of picric acid, and apply the gauze, cotton-wool, jaconet, and bandage as before. Continue this treatment twice daily for three days. On the fourth day the ulcers will be found to present a healthy appearance, the heat and swelling will be greatly diminished, and discharge will have practically ceased.

Further treatment consists in the application of the picric acid dressing, used twice daily, and dabbed on with a piece of cotton-wool; no further bandages are required, and in ordinary cases the horse will be fit for work in from ten to twelve days or so.

Horses under treatment should have gentle walking exercise, gradually increasing, but no hard work until the ulcers have dried up. My experience has invariably been that horses in the first phase of ulcerative cellulitis have the disease greatly aggravated if called upon to do a long march, or other hard work, as is sometimes, of course, unavoidable on Active Service.

I have had only one case so far of a horse, cured by the picric acid solution, having a relapse. This case was a mare (troop horse), cured for two months, but the disease had left her off hind leg a bit "gummy." As she was a show mare I thought I would try and get the leg to its normal size by applying a blister. This unfortunately brought on the ulcerative cellulitis again, ten days after the application of the blister; two ulcers appeared, but she quickly responded to treatment, and was discharged for duty in twelve days; the following day she came along with the regiment on a four days' march, and the leg is now finer than before I applied the blister, but in future I will be content to leave well alone.

It is of interest to note that as ulcerative cellulitis almost invariably occurs below the knee and hock (most frequently the latter), in my opinion a very likely source of infection is the urine, these parts being most exposed to contamination when the horse urinates,

especially when this is done on hard ground. Further investigation as to whether the micro-organism causing the disease exists in the urine is suggested, but this, of course, must be left in the hands of the expert bacteriologist, and if found to be correct, the exhibition of urinary antiseptics would no doubt be of great value.

UNUSUAL RESULT AFTER THE "ROARING" OPERATION.

By W. TAYLOR, M.R.C.V.S., D.V.H., I.C.V.D.,
Punjab Veterinary College, Lahore, India.

On February 1st the patient, a six-year-old waler gelding, was operated upon. When the incision through the membrane into the larynx was made, the left vocal cord was seen to be completely paralysed.

The usual operation of stripping the ventricle was performed, and everything passed off quite successfully. The external wound healed,

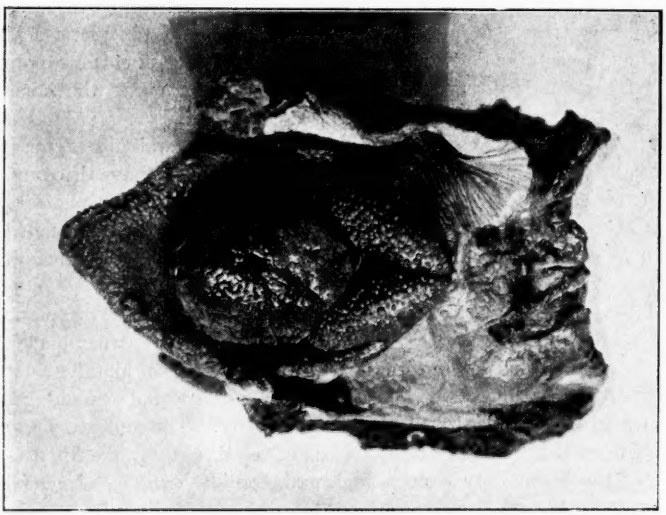


FIG. 1.—Showing the growth as it appeared under the epiglottis.

and the animal was discharged from the hospital on March 24th. The owner was told to give a little walking exercise each day.

On April 28th the horse was sent back to hospital, as the owner said it had a sore throat. When examined it had every appearance of sore throat and irritation of the pharynx, having difficulty in swallowing, although the animal drank a little and also ate a little

bran mash, part of which returned down the nostrils. Two hours later some electuary was given, and also creosote inhalations. No sooner had the inhalations commenced than the horse had a violent fit of coughing, which lasted about half a minute. At the end of that time large quantities of frothy blood were discharged from the nose, the animal walked rapidly round the stable for half a minute and dropped dead.

FIG. 2.—Larynx opened to show the large formation on the left side, and the smaller one on the right side.

On *post mortem* the lungs were found to be full of frothy blood. On opening the larynx, the condition shown in the accompanying photographs was discovered. The left ventricle had healed completely, and would apparently, under normal conditions, have been a perfect cure, but, arising from the point of incision, was a tumour as large as a hen's egg, which almost completely filled the lumen of the larynx. It was of such a size that the epiglottis could not cover it. On the other side of the larynx, where the pressure of the tumour was greatest, another tumour was commencing to form.

THREE CASES OF SARCOMA IN THE DOG.

By CANIS MAJOR.

(1) The champion corded poodle "Japan," winner of 240 prizes, aged 14 years, which I had previously attended for minor ailments, was the subject of a tumour which was discovered upon the left elbow when he was being clipped. It was found to be ulcerated, and the smell resulting from it most offensive. Although suspicion of malignancy was mentioned owing to its size, its discomfort to the animal, and the abominable smell, I was requested to carry out an operation. One feature worth mentioning about this case, and which most peculiarly prevailed in the remaining two cases, was a peculiar steaming or vapour that seemed to arise from the growth. The operation was carried out satisfactorily by means of local anæsthesia on October 10th of last year, and the growth submitted to an expert for examination and reported upon as being a round celled sarcoma. The operation wound, however, healed satisfactorily, and the animal appeared to be progressing satisfactorily until December 20th, when I was urgently requested to attend. Upon the 23rd he passed away, the cause of death being pneumonia, the symptoms during these few days being distinctive of this trouble and not worthy of description. The seat of operation was quite clean and had healed perfectly. Unfortunately a *post mortem* was tabooed, but I am of opinion that the operation brought about the culminating point. My next visit was by request to attend the interment at a canine cemetery some miles distant.

(2) Yorkshire terrier, 6 years old, a great favourite, having been treated by its owner for some time for a growth upon the radial region of the right fore leg. This having increased rapidly in size, I was consulted as to its nature and mode of treatment. It had all the characters of the former growth badly ulcerated, raw, granulating, evil smelling, and steaming. I at once advised the removal of a small portion for pathological examination, a suggestion which the owner did not agree to, in spite of her great attachment to the dog, early operation being requested—in fact, this seemed to be the only alternative. Owing to its size operation was carried out under a general anæsthetic, viz., morphine hydrochlor being administered prior to choloform anæsthesia. The resulting operation left a fairly extensive wound; this was upon December 1st, and appeared to be going well until a fortnight later, when it began to reappear, and by the 26th had increased to its former size, when I was requested to again operate. On this occasion it was a very difficult process to remove all diseased tissues, and the prognosis given very unfavourable. During the period elapsing between the first and second operation,

and subsequently, the animal suffered much constitutional disturbance, having lost all its former spirit, appetite capricious, and frequently vomiting. Once since this date I have seen my patient, and even in spite of the knowledge of its seriousness, the owner has decided to keep it as long as possible, although a higher opinion has been suggested.

The first growth upon removal was submitted to a pathologist, and reported upon as a fibroma ; the second recurring growth submitted to the same pathologist minus former history was this time reported to be a spindle cell sarcoma. The termination of the case I am unable to report at present, it being as far as I am aware still being carefully tended by its faithful owner.

(3) An aged Scotch terrier, very poor and emaciated, a frequent visitor to my infirmary, a sufferer from tympanitis. Very reluctant to have the old fellow destroyed, the owner requested me to give him the last attempt at treatment, with permission if this proved futile to put him away painlessly without acquainting owner of my decision. Most careful dieting or treatment failed to accomplish the desired result. No matter how carefully dieted, he became distended with gas. Having been puzzled for a very long time as to the cause of the trouble, I was keenly interested in carrying out a *post mortem* examination, and, seeing how futile any attempt at treatment proved, I obeyed the owner's instructions. The liver was found to be of an enormous size, although this was not evident by palpation during life, owing probably to his tympanitic condition and the difficulty experienced in the examination of the abdominal contents. It seemed to occupy a great part of the body cavity. It had a fatty appearance, although quite firm and solid, not as one would expect in fatty degeneration ; nor on section did it show the presence of fat, whilst the spleen exhibited several tumours (about eight in number). A portion of the liver and spleen was submitted to a pathologist, the report stating sarcoma of the liver and hæmatoma of the spleen.

Following this case I was consulted by a resident medical man to examine a terrier with a large raw ulcerating growth partly in the region of the flank and part in the preputial region, commencing, as he described, as a carbuncle. As it appeared to be a great source of irritation to the animal, constantly licking same, its removal was requested, although the doctor feared its malignancy. This was carried out on October 11th under a general anæsthetic. Great difficulty was experienced in the healing of the wound, bandages being skilfully displaced ; at last an Elizabethan collar of huge dimensions having to be employed to prevent his licking same. Finally, the wound healed, leaving much thickening and scar tissue after four

weeks' treatment in my infirmary. On December 16th I was again requested to call and examine him, when I found the growth to have recurred, smelling most abominably, and apparently steaming. It is here worthy of mention that the growth removed was submitted to an eminent pathologist, who pronounced it to be granulation tissue, resulting primarily from an abscess. My medical client, who, from the first, feared malignancy, gave as his opinion that he placed little faith in pathological examination, and that it had been his invariable experience that tumours showing this phenomenon, viz., sweating or steaming, was a symptom indicative of malignant disease. This is my reason for reproducing his remarks, and I hope that other practitioners of greater experience may be induced to record their observations upon similar cases.

"TIPS" ON CAMELS, FOR VETERINARY SURGEONS ON ACTIVE SERVICE.*

By A. S. LEESE, M.R.C.V.S.

(*Continued.*)

Poisons.

Snake-bite.—Camels are liable to be bitten on lips, feet and belly by snakes. Being a large animal, the camel is better able to withstand the dose of venom than are most other species of domesticated animals. Nevertheless, camels are often lost from snake bite of the more deadly snakes. The symptoms and treatment do not differ from those in other species, generally speaking; but, with camels, there is a tendency to bellow loudly and continuously until coma sets in. It is useful to remember this fact, because, when the snake has not actually been noticed, this symptom may be the means of attracting attention and suitable treatment, which may save life. In my experience, if a camel survives 45 minutes after the bite, he recovers.

Poisonous Plants.

There are some general considerations applying to most plant-poisonings to which camels are liable :—

(i) Camels reared in a district containing a particular poisonous plant are rarely poisoned by it; somehow or other, they learn to aviod it.

(ii) Camels imported into a district containing a particular species of poisonous plant are liable to eat it and poison themselves, particularly in the dry season, when the poisonous plant is often the greenest in the jungle.

(iii) Grass-eating camels are liable to pick up a fatal dose of a poisonous plant by accident when their mouths are full of grass.

* For previous instalments, see page 79 (March), page 136 (April), page 167 (May), page 214 (June), and page 259 (July).

Otherwise, most poisonous plants are disagreeable and not voluntarily taken and swallowed, except by camels which do not know them. In this connection, it may be noted that although Indian camels do not usually eat grass, they do so in the rains, when it is green and succulent.

(iv) Speaking rather generally, it is in nullahs and damp places where most poisonous plants which affect camels are found. The moral of all this is, when camels are advancing in unknown country, to see what plants the nullahs contain, and take measures to prevent camels from grazing where these plants are dangerous.

Leaving out of all consideration the camel-poisons of the Australian bush, the subject may be conveniently dealt with by classifying the usual poisons found in typical camel-country as follows, but the list is, of course, only an outline :—

1. *Poisonous Plants Liable to be Eaten when Grazing.*—These are oleander, datura, irgin, sorghum, and others. Oleander grows in nullahs in stony or hilly country, and is also grown in gardens ; it is very bitter, and generally taken by accident in a mouthful of grass ; a small quantity will kill, the chief poisonous principle being an alkaloid, and the action being depressing and irritant. Dulness, vomition, coma, these are the symptoms ; and diarrhœa may occur if the camel is not dead in twelve hours. Datura has a leaf shaped like that of a fig, and the fruit has a prickly capsule ; datura is found chiefly in the beds of dry watercourses. It is sudden in its effects, and is a nerve-poison ; I have never arrived in time to see the symptoms. "Irgin" is confined to the northern part of the British Somaliland Protectorate ; it looks like a lot of green candlesticks curving up from a common stem, and contains a white irritant milky fluid. Irgin is an irritant poison producing pharyngitis, vomition and diarrhœa, but many camels recover from it under proper treatment. Sorghum poisoning, from browsing on a stunted crop of jowari in a rainless season, is a well-known subject and only requires mention here. The Muttur pea is eaten by camels without harm in the form of green forage.

2. *Poisonous Plants Liable to be Fed to Camels among Refuse thrown away by Gardeners.*—This form of plant-poisoning is common in Indian cantonments, oleander, datura and narcissus being amongst the known culprits. Camels should never be given gardeners' refuse.

3. *Poisonous Plants which Camels do not Eat.*—The various kinds of cactus and euphorbia come under this head, as also does the Sodom apple (Calotropis procera). These contain an irritant milky fluid in their stems, especially the last-mentioned, which is found in most camel countries. This juice sometimes blinds camels, which get some of it into their eyes when grazing.

The castor oil plant is found in many camel-countries but the leaves

when eaten appear to have no poisonous effect, and I have no record of any authentic case of poisoning by it in camels.

4. ***Plants which afford good grazing to camels which are used to them but which cause indigestion when eaten by imported camels not used to them.*** —Among them are salvadoras, salsolaceous plants growing along the coast, garras, mangrove, wild jujube, and many green fodder crops, such as mote, mung, taramira and trefoil. All these should be fed sparingly, at first, to strange camels.

Notes on Treatment of Poisoned Camels.—An oily purge gives the best results, particularly linseed oil, 2 quarts, with turpentine oil, 1½ ozs. Soup from a fat sheep's leg is a good demulcent for the irritant poisons, as also is linseed tea. Hypodermically-given purges may be tried. In Western Australia, potassium permanganate, thoroughly dissolved, is used to neutralise alkaloids ingested in poisonous plants; 1 or 2 drachms might be given. Suitable stimulants are found in strychnine (not exceeding 1½ grains hypodermically), ammon. carb., ½ to ¾ ozs., or rum, 4 to 6 ozs.

Diseases of the Eye.—The camel is very subject to conjunctivitis, keratitis and opacities of cornea, the common causes being injury by thorns, contact of the milky irritant sap of the euphorbias and of the Sodom apple, injury self-inflicted when trying to rub ticks from the eyelids, blows, and so on. Very exceptionally, ocular symptoms are met with in trypanosomiasis in camels, as is the rule with dogs suffering from that disease; in this case, the keratitis is of both eyes. The worm Thelazia leesū, which is found in the conjunctival secretion, has not yet been found to have produced conjunctivitis, although one of the worms in an abnormal position is thought to have caused ophthalmia in one case.

Congenital absence of pupil has been seen in a camel. The normal black curtain over the pupil which has the same function as the less-developed corpora nigra of the horse, is sometimes absent in one or both eyes; such eyes are very prone to cataract. Cataract is very common in camels; all sizes, shapes and colours of cataract are met with, and in camels of any age. One-eyed camels are useful for work excepting in mountainous country, where they are liable to fall down ravines. Dislocation of the eyeball is seen in "Kapáli," a disease to be described under "Surgical diseases of the head,"

Amaurosis is one of the symptoms of "Mad Staggers"; it also occurs from the ingestion of the pods of acacia arabica in large quantities when invaded by a certain red fungus; both forms are curable, the latter often only after some weeks. An incurable amaurosis is sometimes found following suppuration of the frontal sinus; it generally affects one eye only.

Surgical Diseases of the Camel.

In the general surgery of wounds and abscesses there are a few practical matters which may be mentioned :—

1. Owing to the comparative inelasticity of the skin, accumulations of pus may form under it without much swelling.

2. Camel pus is often so thick in its consistency that it cannot readily escape through small openings. Long incisions are indicated when opening abscesses or making drainage for wounds.

3. There is a strong tendency in camels' tissues to encapsule an irritant agent, *i.e.*, to form inflammatory fibrous tissue around it.

4. In many countries, "fly-blow" has to be guarded against. (Turpentine and vaseline, mixed, is the agent against fly-blow that I favour most.)

The treatment of wounds, etc., in other respects does not differ much from that accorded to other veterinary patients. If crows are a nuisance, a crow's feather tied to the hair close to the wound will prevent them coming to peck at it.

Surgical Diseases of the Head.

Torn nostrils, tooth troubles and inflammation of the palatal expansion, have been described already. The characteristic diseases of the camel which remain to be dealt with in this region are :—

1. "Kapali."
2. Suppuration in frontal sinus.
3. Fracture of lower jaw.
4. Suppuration in external auditory meatus.

1. *Kapali.*—This is an Indian word and is used for several distinct diseases of the head, but is particularly applied to the extraordinary condition about to be described.

This consists in a phlebitis of the nasal branch of the submaxillary vein, arising from a septic wound about the nose or muzzle ; generally the nose-peg wound is the starting-point, but I have seen it follow an injury to the anterior part of the hard palate between the two upper incisors ; and sometimes a rope gall over the nose is the starting-point. This phlebitis spreads until it reaches the other branch of the submaxillary vein, the one which runs into the supra-orbital foramen in the camel. The inflammation spreads along this vein until it reaches the back of the orbit, and there causes a swelling which pushes the wretched animal's eyeball out until it is "dislocated" and ruptured. By infection through the foramina at the back of the orbit, the camel soon dies of meningitis.

The first symptom is a diffuse swelling of one side of the face, associated with a septic wound about the nose or palate. The camel

goes off his feed early in the attack ; within twenty-four hours the eyeball begins to bulge and is pushed out of its socket ; sometimes both eyes are pushed out (because the two veins are joined by a small branch running over the bridge of the nose). Convulsions, coma and death close the scene within three days.

One wonders how Christian scientists would explain away this horrible disease. Treatment is generally useless, and the poor brute should be shot to save suffering. Under certain circumstances, it might be possible to save life by early removal of the eyeball, but if the camel subsequently died, the veterinary surgeon would certainly get the blame for it.

2. *Suppuration in Frontal Sinus.*—In two important respects, the frontal sinus of the camel differs from that of the horse, although it occupies a similar position :—

(1) It communicates by a curved slit with the nose (and not with the superior maxillary sinus, which is very small).

(2) The supra-orbital foramen pierces the frontal bone near the middle line, so that there is a fairly long bony canal containing the supra-orbital vessels before they reach the orbit. This canal lies in the frontal sinus and forms an " elbow " turn inside it. The only cause I recognise for this disease in camels is a blow over the head. I have never known it follow catarrh, and it could not possibly arise from suppurative alveolar periostitis.

The symptoms differ in detail from those shown by horses. In camels—

(1) Nasal discharge is not invariably present.

(2) When present, it rarely smells.

(3) When present, the discharge generally runs from both nostrils, but most comes from the affected side. (The condition was unilateral in every case I have had.)

(4) As often as not there are marked swelling and tenderness of the frontal bone over the diseased sinus.

(5) Pus has a great tendency to work through the bone and come out on to the face. The favourite places for it to burst out are (*a*) above the nasal canthus of the eyelids, (*b*) behind the supra-orbital process of frontal bone, and (*c*) near the middle line. In the latter case, probing settles which side is involved.

(6) Nasal discharge is not through the curved natural slit of the frontal sinus but through an adventitious opening (the bone being perforated by the suppurative process). There is usually a curious carriage of the head, the nose being tilted higher than usual.

(*To be continued.*)

Translation.

THE SERVICES OF VETERINARY MEDICINE IN THE WAR.

By EUGEN FRÖHNER.

THE world-war of to-day has placed important tasks upon veterinary medicine in regard to the treatment of sick horses, the suppression of infectious diseases, and the organisation of the military service. The healing art, which during the last few years, through the operation of veterinary and sanitary police, has been somewhat elegated to the background, again comes into its own through the war. Apart from internal and surgical diseases of army horses, the infectious diseases acquire great significance. In the forefront stands glanders, which moves from east to west, and threatens the readiness for battle of the German army, as well as the horse-breeding industry. The blood test and the eye test together make it possible, however, to suppress it quickly and surely. By investigations in a horse lazaret for glanders it is now undoubtedly proved that glanders much more frequently heals by calcification of the glanders nodules than has hitherto been supposed.

An invasion from rinderpest and the widely-prevailing parasitic bronchitis in the occupied regions of the north of France should be avoided. Effective measures have also been taken against the piroplasmosis prevailing in Flanders and Macedonia, which is spread by ticks (dermazentor reticulatus). A disease hitherto unknown in Germany and prevailing in Austria and Belgium since the war, known as infectious broncho-pneumonia, which runs an insidious course, and causes a heavy death rate (mortality 12 to 28 per cent.), has been favourably influenced by intravenous injections of sublimate solution —a quite new procedure in the treatment of lung diseases. Protective inoculations against strangles were quite ineffective, but curative inoculations by means of large intravenous doses of serum—as in petechial fever (purpura hæmorrhagica)—were often successful. Pernicious anæmia appeared several times in Flanders and the North of France. Its spread seems to result from insect bites or stings as in piroplasmosis. War rations reduced the peace proportion of cases of illness due to overfeeding, and mostly had a favourable influence on the condition of the horses. Hay and straw could be quite well replaced by heather (calluna vulgaris). [The sequence seems to be only natural.—*Translator.*]

Food poisoning in a great number of cases was noticed. Thus intestinal catarrh arose from sugar and molasses poisoning; colic, inflammation of the kidneys, paralysis, laminitis, greasy heels, and other skin diseases coincident with mange were

evident. Castor oil poisoning arose from feeding on linseed cake containing ricinus. Characteristic poisonings were brought about by nibbling the untrimmed pine stems from the walls of shelters, and from the taxus shrubs covering the walls of rifle pits. Besides these, white lead poisoning occurred in horses billeted in a white lead factory; copper poisoning after feeding on wheat dipped in blue vitriol; glanders-like nasal ulcers after inhalation of lime in street dust, and similar diseases of the mucous membrane after disinfection of scabies stalls with lime; numerous carbolic, cresol, and petroleum poisonings as the result of the use of impure preparations in the treatment of mange; there were occasional poisonings due to partaking of laburnum, meadow saffron, beech nuts, dogs mercury and atropa. The copper preparation optochin used in human medicine against inflammation of the lungs leads to incurable blindness; its use in veterinary medicine is, therefore, to be adopted with great caution and only subject to daily use of the ophthalmoscope.

Through the war the relations between human and veterinary medicine are closer. The doctor's war surgery has taught the veterinarian a good deal, but human medicine has learnt something from veterinary medicine, especially in the field of the diseases communicable from animals to man. Glanders and mange have frequently been transmitted to men, and many a veterinary surgeon has experienced glanders infection. The relation of symptomatic anthrax of animals to the so-called gaseous emphysema of man is to-day clearer among doctors than before.

Medical study at the German universities will in future include a course in veterinary medicine.

The military organisation, bad at first, now includes mobile and immobile horse depots and horse lazarets, glanders and mange lazarets, blood examination stations, carcase destructors, etc. Besides the divisional, army, and chief veterinary surgeons, there is still lack of organising personnel of the first rank and more especially of an investigator (research conductor) of the highest scientific eminence —a field veterinary chief.—*Swiss Veterinary Journal.* G. M.

Reviews.

THE TREATMENT OF INFECTED WOUNDS. By A. Carrel and G. Dehelly. Translation by Herbert Child, Captain R.A.M.C., formerly Surgeon French Red Cross, with introduction by Sir Anthony A. Bowlby, K.C.M.G., A.M.S., consulting surgeon to the British Armies in France. Crown octavo, pp. x+238; 97 illustrations; price 5s. net. Publishers: Messrs. Baillière, Tindall & Cox, 8, Henrietta Street, Covent Garden, London.

This book explains the principles of what is known at the front

as " Carrel's Method " of treating wounds. The solution used in the treatment is Dakin's hypochlorite, which was produced by Dr. H. D. Dakin, of the Herter Laboratory, New York, and has been largely used by Dr. Carrel, and made a name for itself, not only as an efficient steriliser of a septic wound, but has also been very useful in the treatment of healthy and suppurating wounds. The solution used, if to be of value, must be made strictly according to Dakin, and the technique of sterilisation is to be carried out in the manner described by the authors, and which includes the processes of mechanical, chemical, and surgical cleansing of lesions and their chemical sterilisation. Clinical and bacteriological examination of wounds is of first importance as a guide to treatment. Instillation of the liquid into the wounds is accomplished by a system of tubes, and is done very effectively and thoroughly. Under the influence of this method of wound treatment marvellous things have been done. Compound comminuted fractures of the humerus, tibia, and femur have been successfully treated in a great number of cases without the patient losing the limb, and grave wounds involving articulations have likewise been closed without complications. No man interested in the surgical treatment of wounds ought to miss getting this book. Its pages reveal one of the great wonders of the War, and bring added honour to the records of medical science. The secondary closure of wounds will perhaps interest veterinary surgeons most, but every page in the book is instructive and full of value to those who desire to know how the ideal treatment of a wound is to be carried out. G. M.

ANNUAL REPORT OF PROCEEDINGS UNDER THE DISEASES OF ANIMAL ACTS, THE MARKET AND FAIRS (WEIGHING OF CATTLE) ACTS FOR THE YEAR 1916. Published by H.M. Stationery Office, Imperial House, Kingsway London, W.C.

This report compiled by Mr. A. W. Anstruther, Assistant Secretary to the Board of Agriculture, shows that good work has been done here in the control of animal disease during war-time. Only one confirmed outbreak of foot-and-mouth disease occurred, as against fifty-six and twenty-seven in the two preceding years. Twenty-five cases of suspected disease were reported, but these were unconfirmed. There is reason to believe that there are one or two forms of stomatitis simulating foot-and-mouth, and the differentiation is a matter of much importance.

Parasitic mange is on the increase. Anthrax and glanders showed decreases of four and two respectively from the previous year. In the case of the former disease, in one outbreak the danger of skinning an animal dying suddenly was well exemplified, for the deaths from anthrax of fourteen cows, one horse, one goat, and four calves were traced to the dragging of the skinned carcase of a cow through the barn, across the rickyard, and burying it near a stream.

The modern serum treatment of swine fever was adopted in 79·3 per cent. of suitable cases. The owners of pigs, therefore, responded very well to the offer of serum treatment by the Board. The conditions under which the serum is now applied are calculated to produce the best results.

No animals with scheduled contagious disease were imported into the kingdom in 1915 and 1916, which is very gratifying. G. M.

PRINCIPLES OF MICROBIOLOGY.—A treatise on Bacteria, Fungi and Protozoa pathogenic for Domesticated Animals, by Veranus A. Moore, B.Sc., M.D., V.M.D., Professor of Comparative Pathology, Bacteriology and Meat Inspection, New York State Veterinary College. 101 illustrations, pp. 486. Price 17s. Published by the Macmillan Company, New York.

This is a useful and lucid text-book written chiefly for the student of microbiology. It is admirably planned, so that he who wishes to gain knowledge of bacteria may gradually assimilate information leading up to a complete understanding of their form, life-history, method of examination, place and rôle in nature, the relation they bear to animal disease, and their effects on tissues which they invade. The teacher of proved capacity has an advantage over the mere maker of books in that he is likely to know the varieties of men's minds, the puzzles and difficulties that confront them in learning a subject, and the pitfalls they may encounter in their pursuit of knowledge. Professor Moore seems to have borne these things in mind in the writing of his book with the result that it is very readable and understandable.

The method of dealing with experimental animals, the discussion of protozoology and a discourse on the filterable viruses all receive due attention. The work concludes with chapters on serum diagnosis, and immunity and vaccine therapy, in which the essential facts and principles of the subjects are put before the reader quite plainly. We think this book is a valuable addition to the literature of microbiology, and it has the virtue of not being burdened with extraneous and superfluous matter. To veterinary surgeons, students, and those holding official positions in connection with the control of animal diseases it ought to prove exceedingly acceptable and instructive.

G. M.

ERRATUM.

IN the July issue of THE VETERINARY JOURNAL, on page 264, second line, Major E. M. Percy, M.R.C.V.S., should read Major E. M. PERRY, F.R.C.V.S.

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